Mobius 3 Circuit Board Programming Instructions

Introduction

The Mobius 3 Power System consists of at least 4 circuit boards that need to be programmed. Two of the boards use the Atmel *ATMega32A* processor, and two (three if there are two DC-DC boards in the system) use the Atmel *AT90USB1287* processor. Since the programming software has to be configured for the processor being programmed, you should program all the boards that have similar processors before moving on to the other type:

Holster Charger	ATMega32A
LCD Board	ATMega32A
Control Board	AT90USB1287
DC-DC 1 Board	AT90USB1287
DC-DC2 Board	AT90USB1287

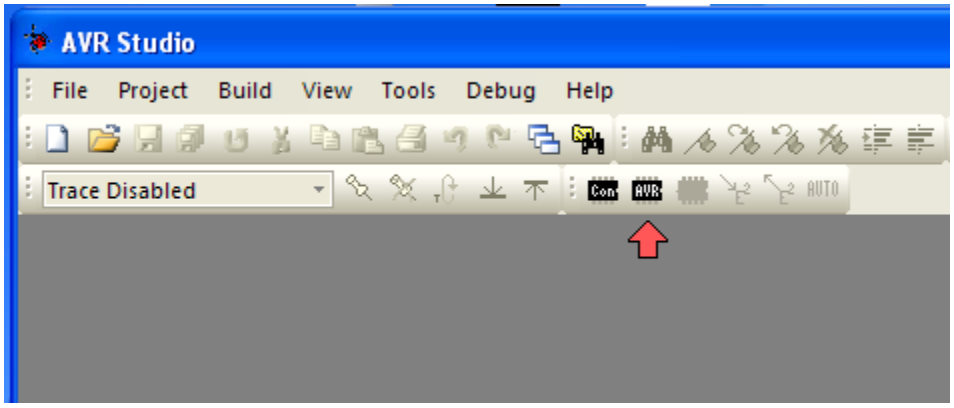
Preliminary Setup

Attach the AVR programmer to the computer with a USB cable. This document assumes use of the AVRISP MK II ISP programmer.
Apply power to the Mobius Power System. *The circuit boards must be powered on to be programmed*.
Connect the ribbon cable to the first board to be programmed, using the ISP connector. The red led on the programmer will turn green when properly connected.

Programming Sequence

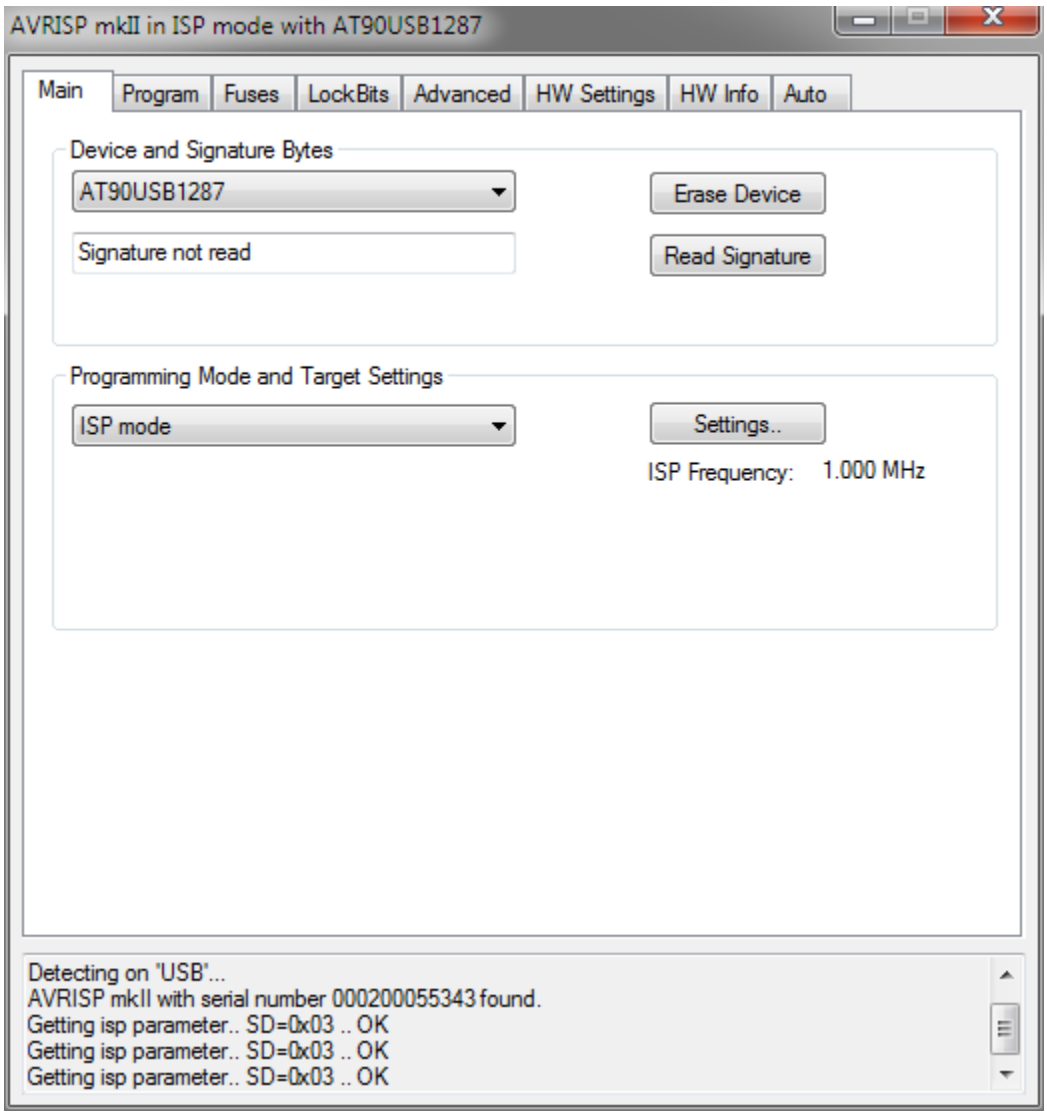
The following scenario assumes that the Control Board will be the first one programmed.

Start up AVR Studio, and select the icon that opens the programming dialog box:



Select the icon designated by the red arrow.

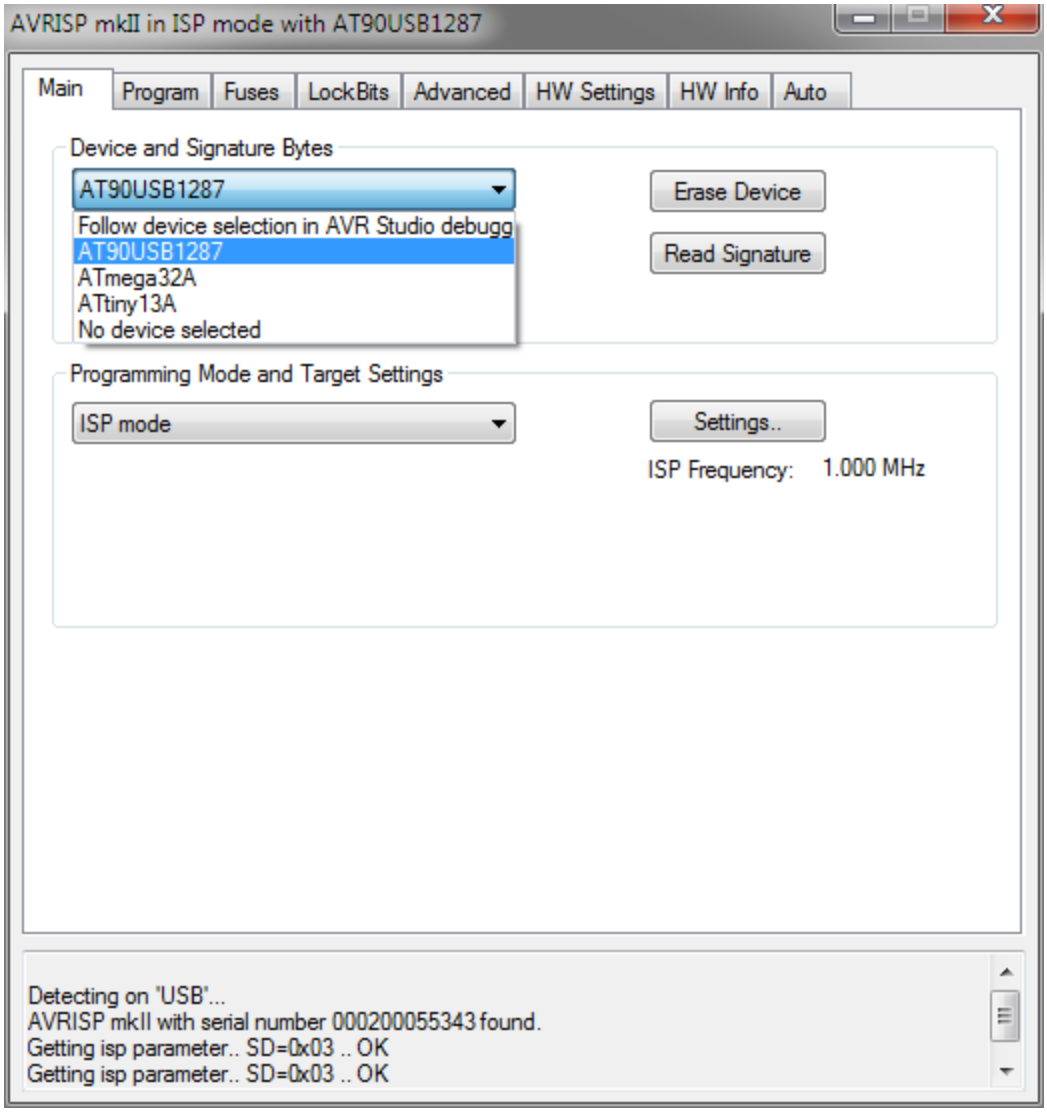
Select the first (leftmost) tab entitled Main.



The status area at the bottom tells you that it found the programmer on the USB port.

There are two dropdowns on this tab, one to select the processor, and one to select the programming mode; one button to change the settings, one button to read the devices signature, and one button to erase the device.

Let's select the processor type first.

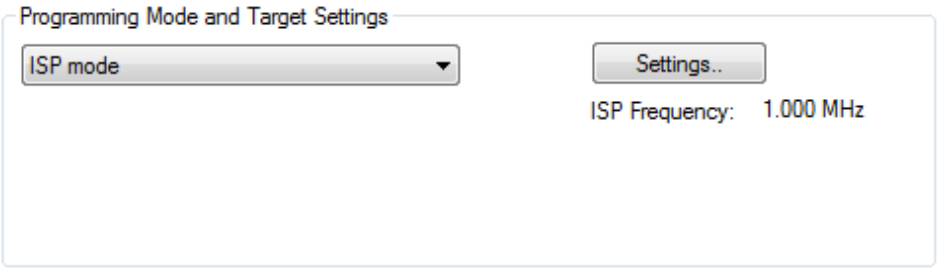


Click the arrow to activate the dropdown.

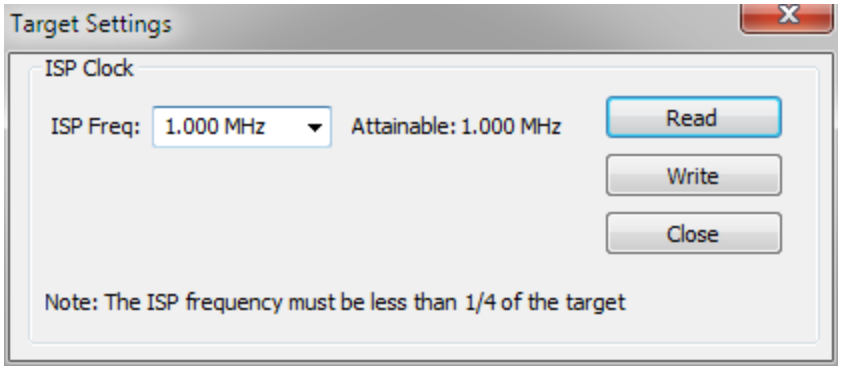
Scroll as necessary to locate the processor for the board you are programming.

Highlight the entry and click it.

Next, select the programming mode:



For the AVRISP MK II, ISP mode is the only choice.

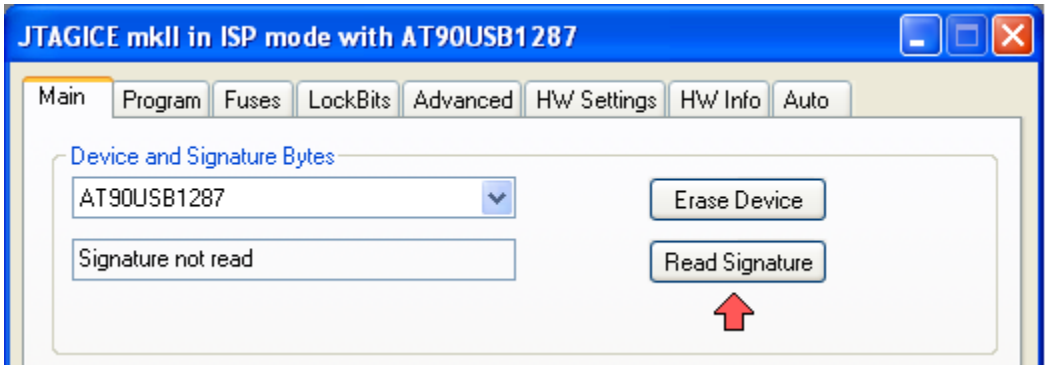


Press the Settings button.

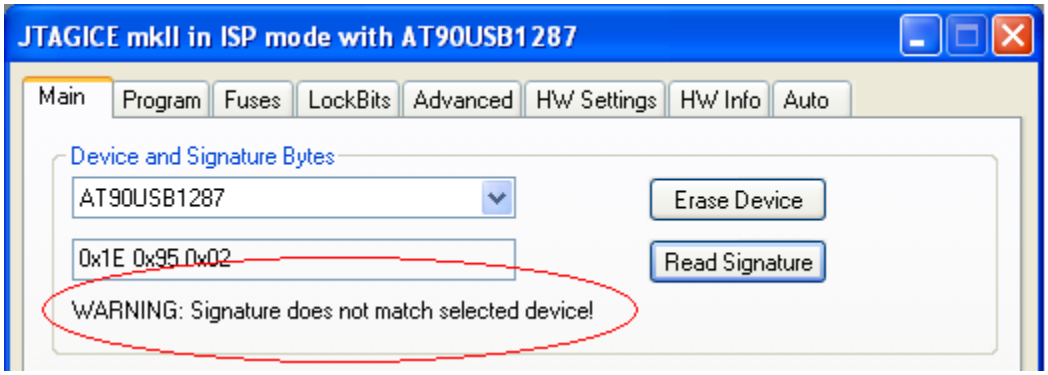
Change the ISP Freq: setting to 1.000 MHz. Do not set it higher. Notice the Note at the bottom of the dialog. Press the Write button to save it to the programmer. Press Close to exit the form.

VERY IMPORTANT: The 1.000 MHz setting is for circuits that have an 8 MHz crystal controlling the microprocessor. If the microprocessor uses an internal oscillator (such as the ATtiny13A), then the setting must be changed to 6.48kHz.

To verify that you have selected the correct processor and that the programming mode is ISP, press the *Read Signature* button:

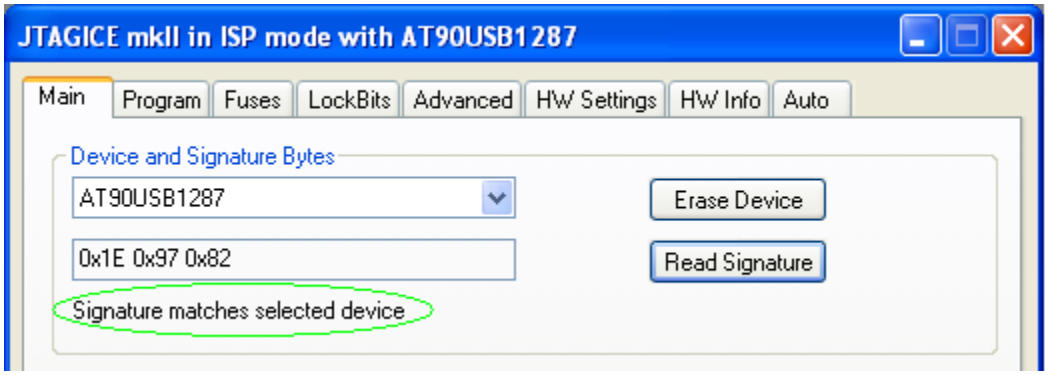


If something is wrong, you will get the following message:



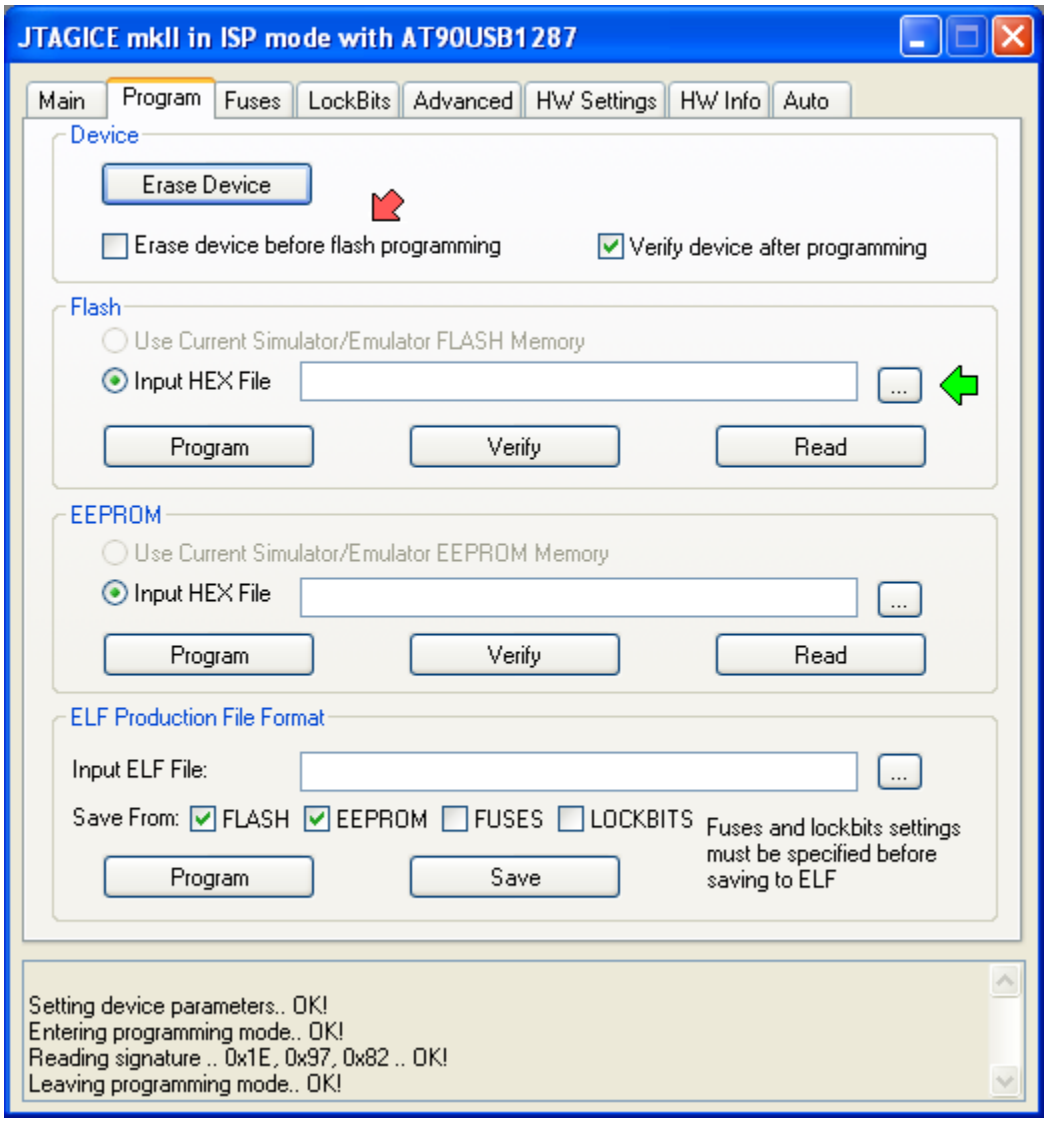
Wrong device selected, or wrong board connected, or wrong ISP Frequency selected.

If everything is OK, you get the following message:

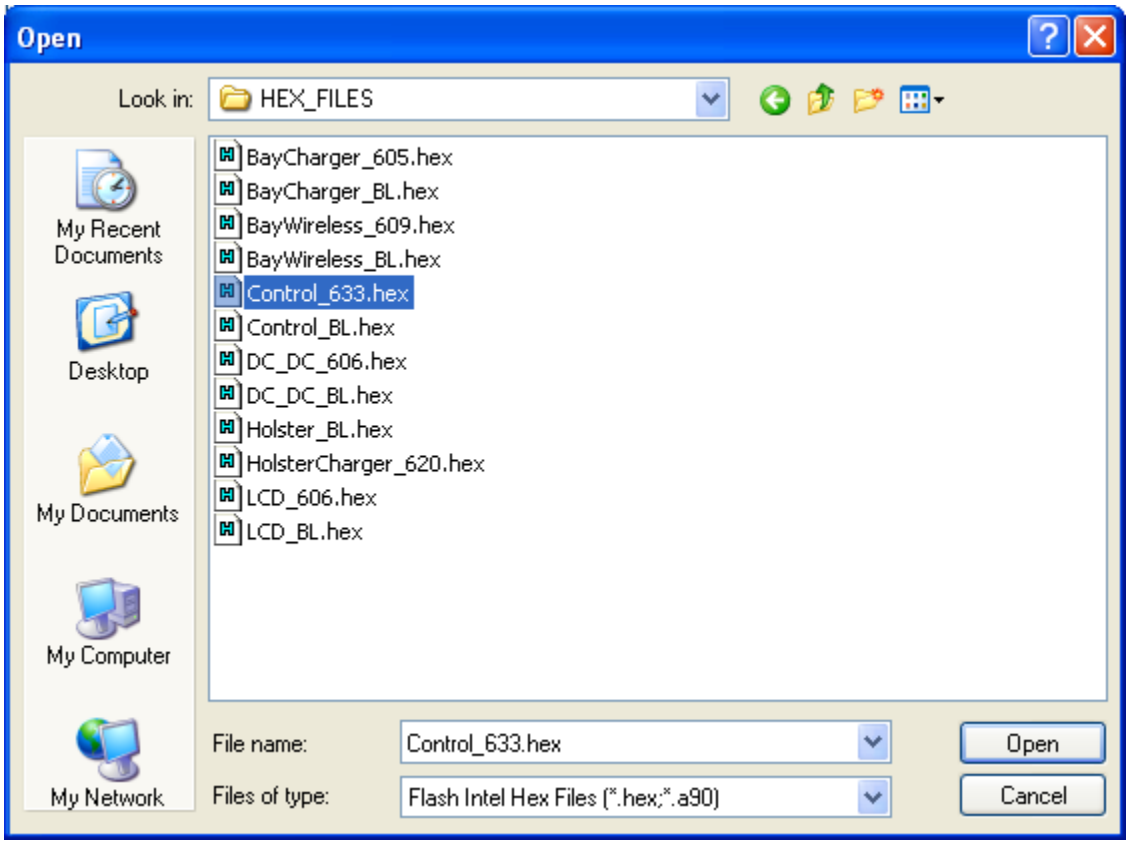


OK

Next, select the Program tab. Make sure the “Erase device before flash programming” checkbox is unchecked.

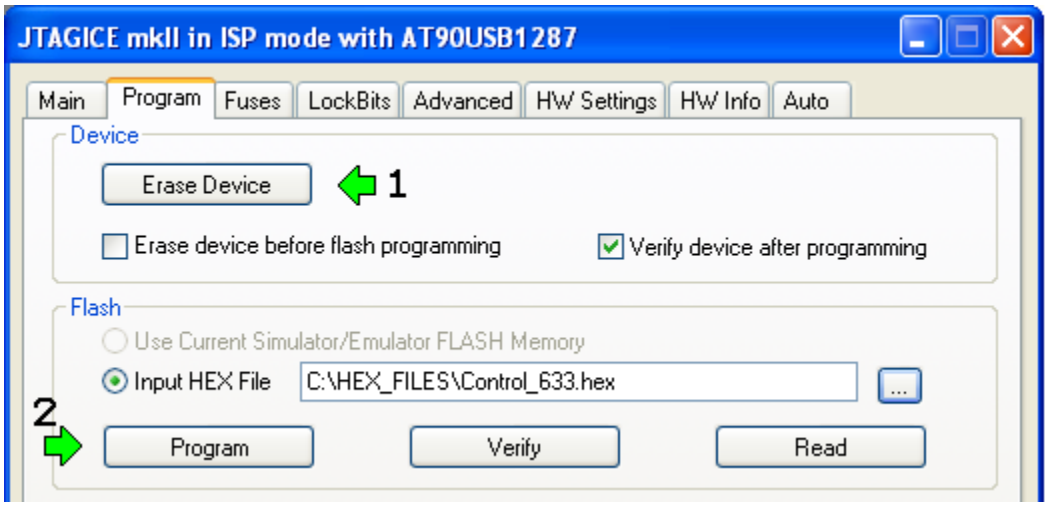


Then press the file locator button under the *Flash* groupbox.



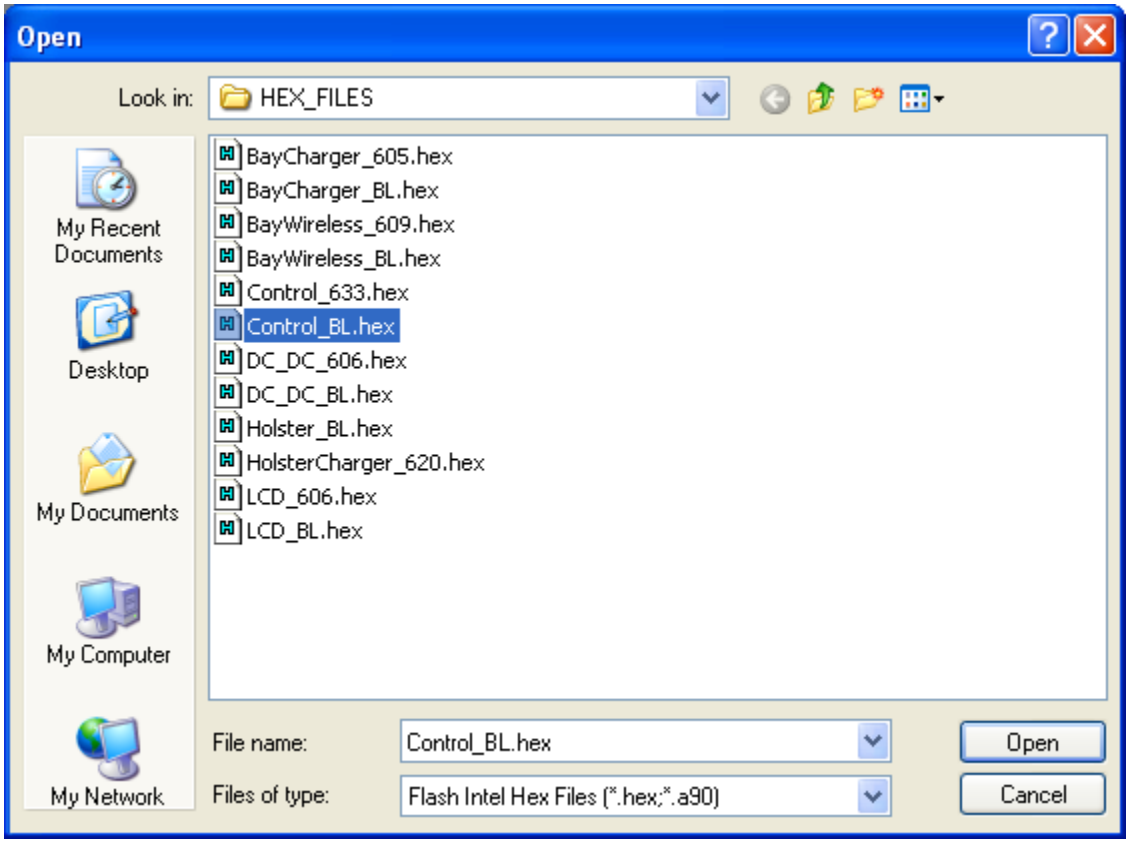
Navigate to where the HEX files are stored and select the appropriate one for the board you are programming. Note that there are two hex files for each board. The main file will have the board name followed by the version number. The second file will have the board name followed by a BL. This is the bootloader file and will be installed after the main file. You will always install the main file first, followed by the bootloader file. Note: Version numbers may be different from what is shown above.

After you have selected the main HEX file, Press the *Erase Device* button. You will only do this once per board. It only takes a few seconds to erase the device. Next press the *Program* button. This will take several seconds, depending on the size of the file to be loaded.



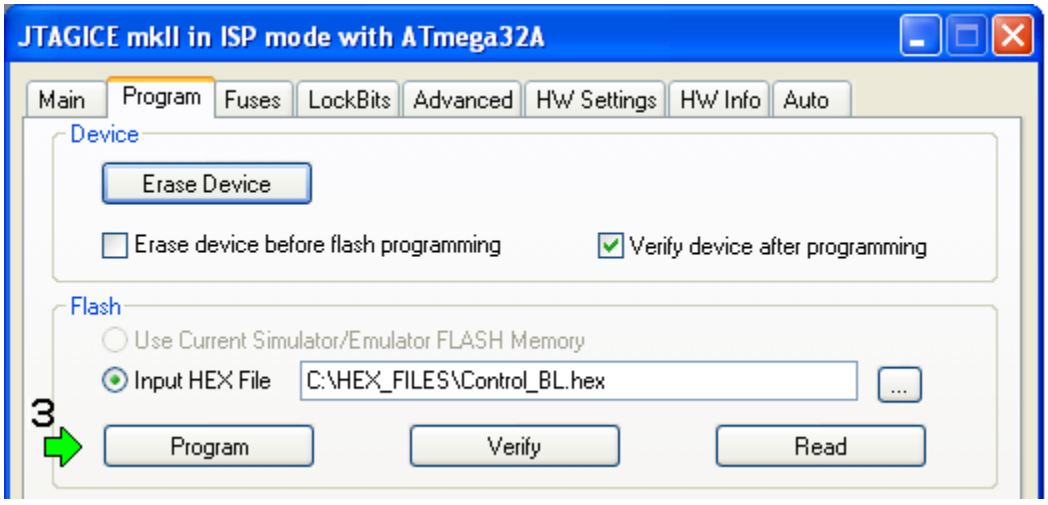
You can monitor the progress by watching the progress bar in the main application. The progress bar will make two passes: once for the programming and once for verification.

When programming is complete, Press the File Locator button again and choose the bootloader file:



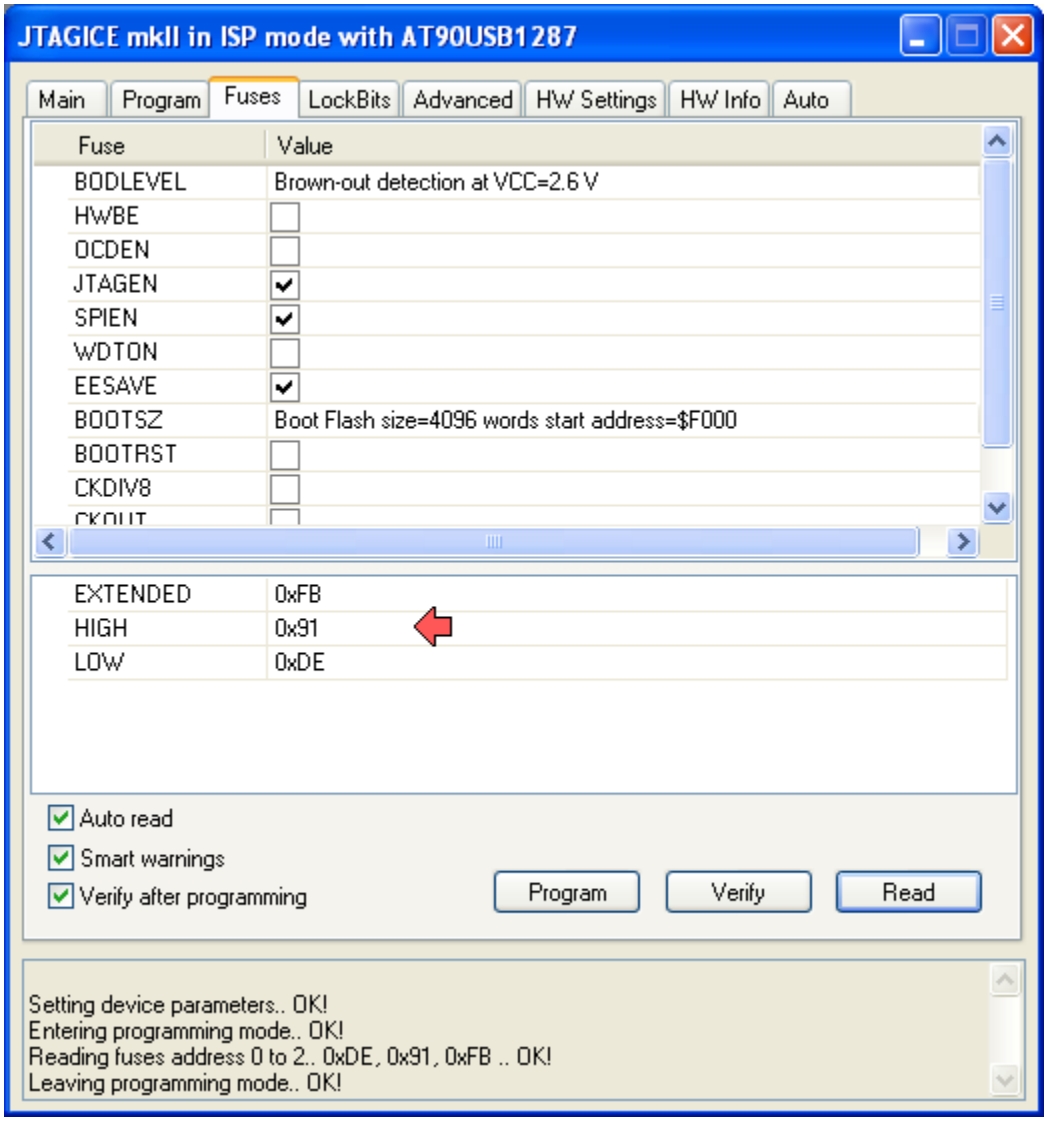
Choose the boot loader file for the board you are working with.

Then press the Program button to load the bootloader. Do not press the *Erase Device* button!



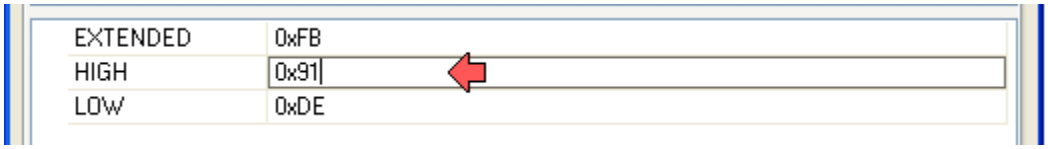
Again, the progress bar will make two passes.

Finally, select the *Fuses* tab. The fuse settings will be read as soon as this tab is selected. Make sure the fuses are set up as shown in the picture for the AT90USB1287.



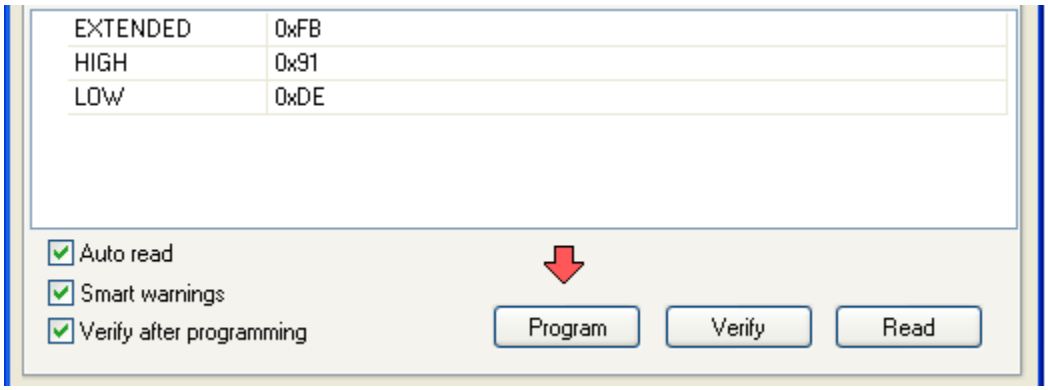
You do not need to check the checkboxes to make changes; just enter the values directly as shown below.

You can change the values directly by clicking on the wrong value and typing in the correct value:



Here are the values for the ATMega32A:

Press the Program button to program the fuses:



Programming is now complete and you can disconnect the programmer from the board.